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ABSTRACT

Ten 3-year-olds and their mothers were videotaped in two alphabet learning tasks to determine how young children would interact with computers as compared with more typical preschool learning activities. Subjects were introduced to the computer alphabet game "My First Alphabet" for 12 minutes and then reconvened following a short break for a 12-minute book-reading session. Findings indicated that the mothers produced different patterns of verbal events than did the children. In addition, although language complexity was not affected in either case, the amount of verbal interaction was dramatically greater in the book-reading than in the computer session. Because of the computer's novelty, findings were inconclusive in assessing the degree of interest and involvement of parents and children in book versus computer settings. It was suggested that future researchers discover whether differences exist between computer and reading interactions after subjects are more computer experienced. (BJD)

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Parent-Child Interaction and Computer Learning: An Alphabet Game for Preschoolers

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Paper presented at the American Educational Research Association, April 1984

Around Christmas time you may have seen an ad on TV by a major company that used to be in the personal computer business. "He's only 3... and already he's reaching out. Seeking and looking to you to point the way. Now is when a Texas Instruments computer can give him a head start." The ad showed an appealing little three-year-old and his dad interacting with a home computer. The message is that there are important educational opportunities a personal computer can provide, even for really little children. The home computer is being pitched as a valuable tool for upwardly mobile parents who want to provide their children with the latest in educational technology.

Even before we saw ads such as this one, we were interested in how very young children would interact with computers compared with more typical preschool learning activities. So, we designed a project to study one of the most important accomplishments of the preschool years, learning the alphabet. Preschoolers traditionally gain experience with the letters of the alphabet through interactions with family members, from children's TV, in nursery school, in playing with certain toys (i.e., alphabet blocks), and from alphabet books. Now there is a new medium; several software packages are now available for learning the alphabet on the home computer.

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We chose alphabet book reading as the best task with which to compare the computer activity for several reasons. First, both present fairly similar content. Second, both elicit a high degree of parent-child interaction.

Third, while virtually no previous research exists on computerized alphabet learning in preschoolers, there are several previous studies of parent-child picture-book reading (DeLoache, 1984; Guinagh & Jester, 1972; Mendoza, 1978, Ninio, 1980; 1983; Ninio & Bruner, 1978). From these studies we know that joint picture-book reading seems to involve a great deal of direct teaching by the mother (Mendoza, 1983). For instance, mothers are much more likely to label objects pictured in books than objects in the real world (Ninio & Bruner, 1978). We wondered whether mother-child computer interactions would be as instructive.

We selected a fairly generic computer alphabet game, "My First Alphabet," marketed by Atari. The program allows the child to select a letter on the keyboard, draws a colorful graphic picture of an appropriate object or animal, draws the letter selected, and also presents several additional words beginning with that letter, and plays a musical tune. Thus, the computer is "active" in the sense that it develops the visual input, and determines the timing of letter episodes. The book, in contrast, requires that participants direct their own attention to particular pictures, via pointing or a verbal narration, and the timing of letter episodes is self-determined. We wondered whether the computer game would hold the child's attention as well as (or perhaps even better than) the book. How would the pace of the interaction differ? Would the language behavior of the parents and children differ in the two settings?

In order to answer such questions, we videotaped ten three-year-olds and their mothers in two tasks. Half the subjects were introduced to the computer first. The alphabet program is so simple that all someone has to do is push a key and watch what happens. After the mother and child were video taped for 12 minutes, a break allowed the child some physical activity, and the computer

was removed. The mother and child then returned to the couch for a 12 minute book reading session. Three alphabet books appropriate for this age range (Allen, 1980; Eastman, 1974; Williams, 1957) were selected on the basis of the simplicity of their pictures and their inherent interest to preschoolers. Instructions in this condition were brief and unstructured, e.g., "Please read these alphabet books to your child as you would at home."

Preliminary Descriptive Analyses

The data were coded by two independent observers, and a high degree of inter-rater reliability was obtained (mean rating reliabilities ranged between .90 and .98). All of the results I'll be describing were reliable at better than the .05 level of significance. The first important result was that the total number of letters discussed in the book reading task was more than double the number of letters discussed during the computer game, as Table 1 at the top of the handout shows. In addition, the number of letters repeated was more than five times as great in the book task as in the computer task. This was undoubtedly a result of the self-paced nature of book reading. We estimated that children in the computer game viewed approximately one and a half letter per minute ($M = 1.53$), whereas in the book task they explored an average of over three and a half letters per minute ($M = 3.62$).

As a rough measure of the amount of overall verbal interaction, we counted the number of turns (defined as a change of speaker) per 12 minute sample. Mothers and children took significantly more turns speaking in book reading than in the computer game. Another way to look at this is to measure cycles of interaction, defined as the number of turns spent discussing a particular topic. As the left panel of Table 2 shows, cycles were most often initiated by the mother (e.g., by asking "What is this?"), and there were over twice as many cycles in the book as in the computer condition. A significant task by

initiator interaction showed that mothers were particularly active in initiating cycles in the book condition. The average cycle lasted about 4 turns, but the range was from two turns to 19 back-and-forth comments on the same topic! Your handout gives examples of long and short cycles from our protocols. By the way, an interesting phenomenon was discovered when we compared odd-numbered vs. even-numbered cycles, as shown on the right hand panel of Table 2. When mothers initiated cycles, they tended to be even-numbered in length; when children initiated cycles, they tended to be odd-numbered. We call this phenomenon "Mothers almost always have the last word." This phenomenon did not vary as a function of the book vs. the computer task. Finally, another measure that was not affected by the medium was the mean length of utterance of the children (MLU), an indication of language complexity.

Thus, our initial findings showed that although language complexity was not affected, the amount of verbal interaction was dramatically greater in the book-reading than the computer situation. Our next series of analyses was designed to provide detailed information on what the participants were talking about.

Verbal events

We found that different patterns of verbal events were produced by the mothers than by the children. Overall, mothers talked much more, averaging 227.45 verbal events, compared to 139.30 for the children. The verbal events were categorized into ten classes, seven of which showed significant differences: identifications, requests for identification, comments, directives, questions (other than requests for identification), positive (e.g., yes, umhum, OK, good, etc.), and negative utterances (e.g., no, nope). To equate for differences in sheer talkativeness, we expressed each category

as a proportion of the total number of verbal events, as shown for mothers and children separately in the two panels of Figure 1.

Looking at the mothers first, although their verbal events were distributed differently into the various categories, these differences were gradual rather than sharp. Mothers gave a significantly greater proportion of identifications and requests for identification in the book-reading situation. In the computer game, on the other hand, mothers made a greater proportion of comments, directives, and negative remarks.

For children, in contrast, identifications dramatically exceeded all other categories. The next highest event, comments, also was significantly greater than all other categories. Children made a significantly greater proportion of identifications in the book-reading task. The computer task, on the other hand, produced a significantly greater proportion of comments and questions. Analyses of contingent interactions showed that children were nearly twice as likely to ignore their mother's request for an identification in the computer condition (32%) than when book reading (17% of the time).

Thus reading was more exclusively tutorial in the naming of pictures, whereas the computer game prompted mothers (and to a lesser degree, children) to vary their messages, probably to some extent because of the necessity to talk about how to operate the keyboard, which letter to select next, the need to wait until the computer was done drawing the picture, and so forth. In contrast, mothers and children were well acquainted with the "rules" of how to "operate" a book (don't tear the paper, turn one page at a time, read the book in a foreward direction, etc.) and thus concentrated more directly on naming the pictures.

Behavioral Analyses

Next, a set of behavioral analyses assessed the degree of interest and

involvement on the part of parents and children in the book vs. computer setting.

The looking results showed that participants spent the vast majority of the time looking at either the book or the computer (M = 668.46 sec), with only occasional looks at each other (M = 69.96 sec), and with a only a minimum amount of looking away (M = 33.39 sec). Thus, the computer task and book reading were similar in that they both were highly engaging, and there was no differential tendency for children's attention to wander in one of the activities.

Overall, there was more pointing at the book (M = 142.11 sec) than at the computer (M = 70.50 sec for keyboard plus screen). Furthermore, mothers pointed at the book for more time (M = 203.19 sec) than children did (M = 81.03 sec), whereas children pointed at the computer (M = 114.27 sec) more than mothers did (M = 26.43 sec). While mothers and children were equally active in turning pages while reading, the children were predominantly responsible for operating the computer. It is of particular interest that participants spent ten times more time pointing at the book (M = 142.11 sec) than at the computer screen (M = 13.59 sec), even though both depicted the objects and letters to be named.

Conclusions

Because our study was preliminary there are a number of limitations to acknowledge. One obvious problem concerns novelty. None of the subjects had had much experience with a personal computer before (and none had seen the "My First Alphabet" game), whereas all had previously read alphabet books. Since personal computers are just beginning to gain wide consumer acceptance, it was not possible to recruit a subject pool of "computer literate" three-year-olds for this study. In the future it will be important to discover whether

differences between computer and reading interactions persist after subjects are more computer experienced.

Another limitation was that only one software routine was investigated. This was deliberate; we felt our first investigation should be an in-depth and comprehensive study of a single program, rather than a superficial comparison of several software packages. In addition, the program we studied was quite representative of available alphabet-learning software. However, as Patrick Dickson and others have pointed out (e.g., Borgh & Dickson, 1984), software varies considerably in the extent to which it stimulates involvement, and our results may have differed for other software routines. At any rate, there are a number of changes in content and timing that could be made by designers of software for preschoolers that would stimulate the richer verbal interaction more characteristic of book reading. As a brief aside, some of the pictures in the program we used were tricky, as in a rather abstract sketch of the united states for the letter M [as in "map"], and a little gorilla for the letter G that most of the children labeled "Donkey" [as in "Donkey Kong"].

Finally, we are extending our observations to include a group of fathers and three-year-olds. This is an important extension because although mothers are known to do most of the picture-book-reading with preschoolers, fathers are reported to be more likely to purchase and interact with a home computer. We'll be back with another report to describe the interesting differences in the father-child interactions that we uncover.

Footnote

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Table 1: Preliminary Descriptive Results

Task	Dependent Measure			
	Letters	Repeats	Turns	MLU
Book	43.40	20.90	127.60	2.67
	**	**	**	n.s.
Computer	18.40	3.30	92.60	2.80

Table 2: Cycles

Mean Number of Cycles

	Initiator		
Task	Mother	Child	Total
Book	38.4	13.6	52.1
Computer	14.9	8.6	23.5
Total	53.3	22.3	75.6

Note: All ANOVA factors $p < .01$

Length of Cycles (Odd or Even)

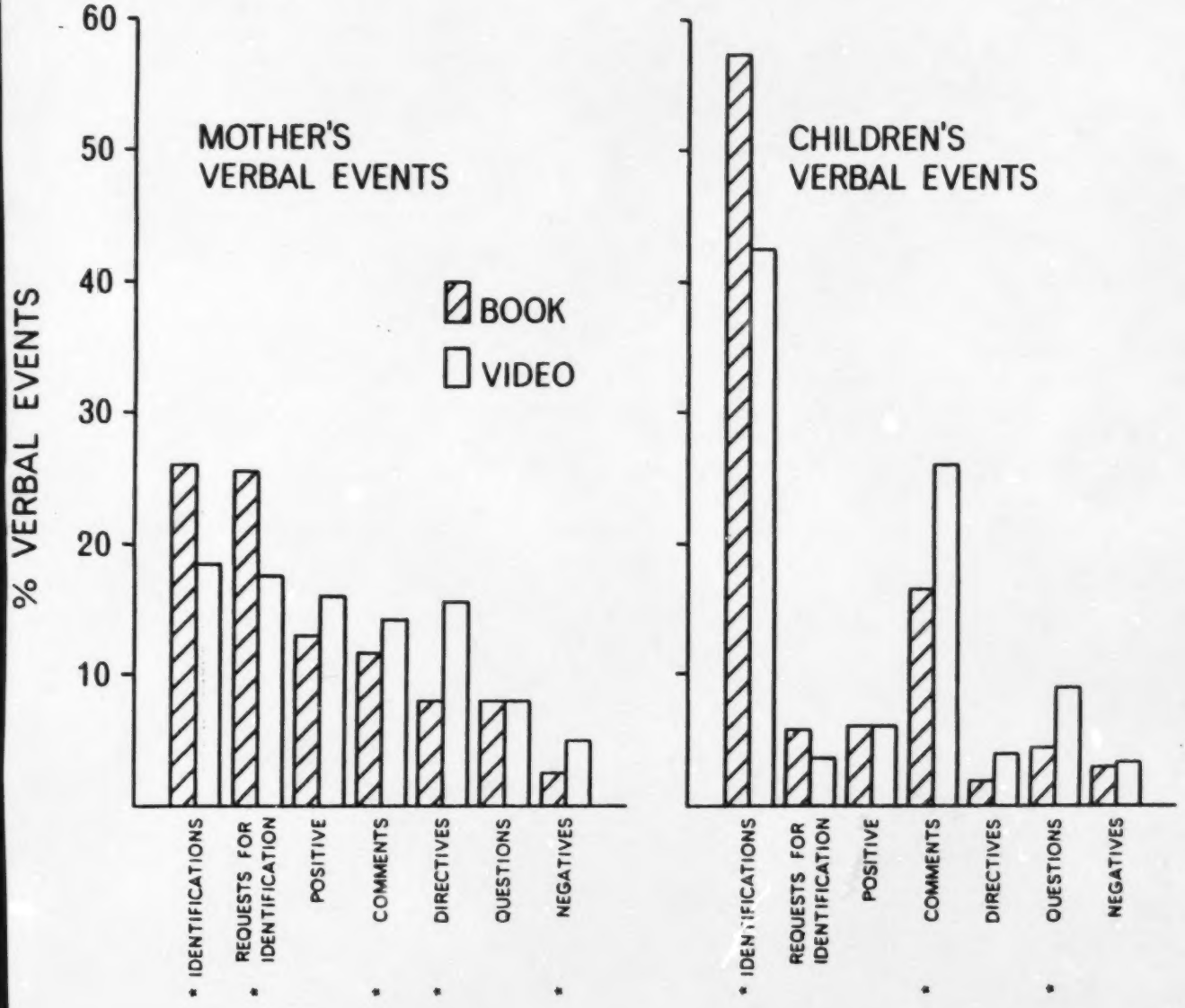
	Initiator		
	Mother	Child	Total
Odd	18.0	18.7	36.7
Even	35.3	3.6	38.9
Total	53.3	22.3	75.6

Chi Sq (1) = 155.87, $p < .001$

EXAMPLE CYCLES

Cycle Length = 2 (Computer Condition)
Mom: Ohh, what's that?
Ricia: M
Mom: M is for map, mother, man and meat.

Cycle Length = 8 (Book Condition)
Mom: Oh, who's this?
Kelly: A mommie.
Mom: Ah, when you go to the doctor, who do you see? Who's the one who, who—
Kelly: Doctor Bowsah.
Mom: Who's the one that helps you. Who's the lady. What do we call her?
Kelly: Doctor Bowsah.
Mom: The nurse? Is that the nurse that we see? What's she gonna give to him?
Kelly: A stick.
Mom: A shot. Mmmm, yes.


% VERBAL EVENTS
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MOTHER'S
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BOOK
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CHILDREN'S
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* POSITIVE
* COMMENTS
* DIRECTIVES
QUESTIONS
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